osteomyelitis

By

Dr Iman Metwaly

Definition

Acute or chronic inflammation of bone and bone marrow of the jaws.

Aetiology:

1.Extention of a dental infection (bacterial infection) *(main cause)*

eg. Periapical absces

periapical granuloma

periapical cyst.

2. Extention of infection from dry socket after tooth extraction.

3. Physical injury as fracture or surgical procedure**.**

4. Haematogenous spread [bacteremia or pyaemia].

5.In **Africa** many cases are due to **Acute Necrotising Ulcerative Gingivostomatitis** (ANUG) → ***Staph.***

Causative organisms

1-Staphylococcus aureus (main type)

2-Streptococci

Types of osteomyelitis

1. **Acute suppurative** osteomyelitis.
2. **Chronic** osteomyelitis.
    1. Chronic **suppurative** osteomyelitis.
    2. Chronic focal **sclerosing** osteomyelitis.
    3. Chronic diffuse **sclerosing** osteomyelitis
    4. Chronic osteomyelitis with **proliferative periostitis**. [**Garre's** osteomyelitis

Predisposing factors

1-Virulence of microorganisms.

1. **Ex. ↑ Virulence of microorganism → Acute type.**
2. **↓ Virulence of microorganism → Chronic type.**

2. **Patient resistance:**

   1. **Ex. ↑ Patient resistance → Chronic type.**
   2. **Ex. ↓ Patient resistance → Acute type.**

NB

So ↑ Virulence of microorganisms } Acute osteomyelitis

+ ↓ Patient resistance

While

↓ Virulence of microorganisms } Chronic osteomyelitis

+ ↑ Patient resistance

3. **Anatomic location**

   ex. Mandible is more affected than the maxilla (Why) ?

because

- ✓ The **mandible** is formed of **thick** trabeculae and cortical plates, **limited blood supply.**
- ✓ While the **maxilla** is **thin** and has a **generous blood supply** with rich collateral circulation**.**

4. **Patients age: Old age > young age.**
5. **Chronic systemic diseases : ex. Diabetes.**
6. **Immunocompromised status : ex. Leukemia AIDS.**
7. **Disorders associated with decrease bone vascularization**{eg. Paget s disease}

Acute Suppurative Osteomyelitis

Pathology:

1-As the **micro-organisms** (ex. staph. aureus) **enter** the bone it will proliferate giving rise to an acute **inflammatory process**.

2-The inflammation causes **increased tension** in the blood vessels situated in the bone.

3-As a result of the blood **vessels can not expand**. This will lead to compression and tendency to **thrombosis** **cut of blood supply** tissue **necrosis** & **suppuration**

4-Inflammation, **necrosis** & **suppuration** spread through marrow spaces through cortical bone until involving the **periosteum**

5-Inflammatory **exudate** causes **stripping** of the periosteum **cut blood** supply from cortical plate **further bone necrosis**

6-granulation tissue is formed between necrosed and living bone. The necrosed bone is then detached from the living bone
and is called **"Sequestrum".**

N.B

I. So **Sequestrum** is a fragment of **necrotic bone** that **has separated** from the adjacent vital bone.

II. The sequestrum is **hard**, **rough**, **porous**, light in **weight**, lighter in **colour** than normal bone.

III. Sequestrum fragment **if small** they may be **exfoliated** through oral mucosa, but **if large** it must be removed surgically.

IV. **Unless** bone sequestrum is **removed** surgically, Pus will continue to discharge.

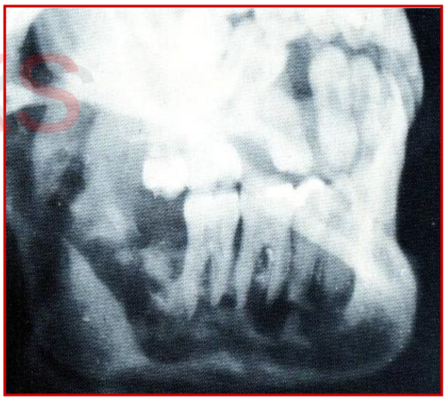
V. **If** the sequestrum is **long standing** and surrounded by new living bone this is called **Involucrum.**

Escape of pus

- When pus is formed it **tracks in various direction** governed **by** the thickness of bone and attachment of the muscles and ligaments.
- It often **discharges** in the mouth or perforates the skin and thus sinuses are formed**.**

Clinical features:

1. Severe **throbbing** , deep seated **pain** & tenderness in the affected side
2. Soft tissue **swelling** [ex. gums]...
3. **Numbness** of the lower lip occurs if inflammation spreads to the **inferior dental nerve**.
4. The adjoining **teeth** become **loose.**
5. If the masseter muscle is involved **trismus.**
6. **Leukocytosis**{ WBCs count}.7 Pyrexia {fever}. **8. Painful lymphadenopathy**

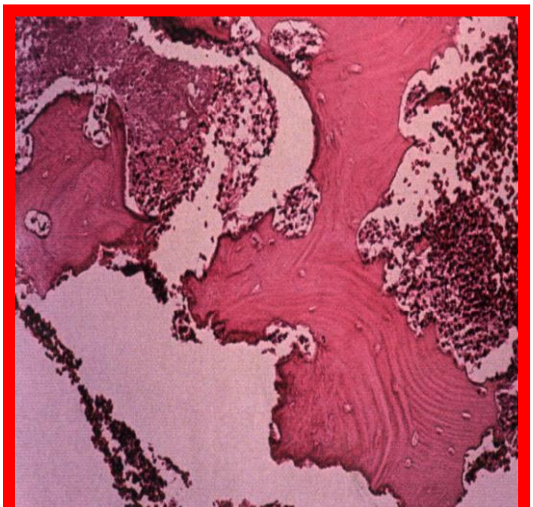


Radiographic picture:

- **No** change in radiograph for the **first 2 weeks.**
- **ill defined** radiolucency.

Histopathology:

1. Bony trabeculae show peripheral **resorption.**
2. Necrotic bone [**sequestrum**] shows loss of osteocytes
3. The bone marrow is infiltrated by acute **inflammatory cells.**
4. Purulent exudates occupies in the bone marrow ***(spaces for pus).***



Treatment:

- Antibiotics and drainage.
- Sequestrectomy. (Removal of dead necrosed bone is a must for healing to occur)

Chronic Suppurative Osteomyelitis

Aetiology:

- May be a **sequelae** of acute osteomyelitis (untreated or inadequate treated).
- May be a **long term**, **low grade** inflammatory reaction from the start.

Ex. High patient **resistance** + **low virulence** of microorganisms**.**

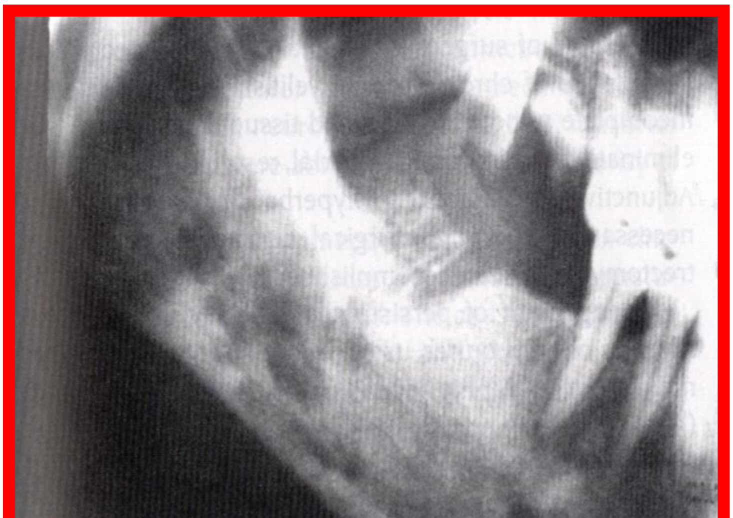
Clinical features:

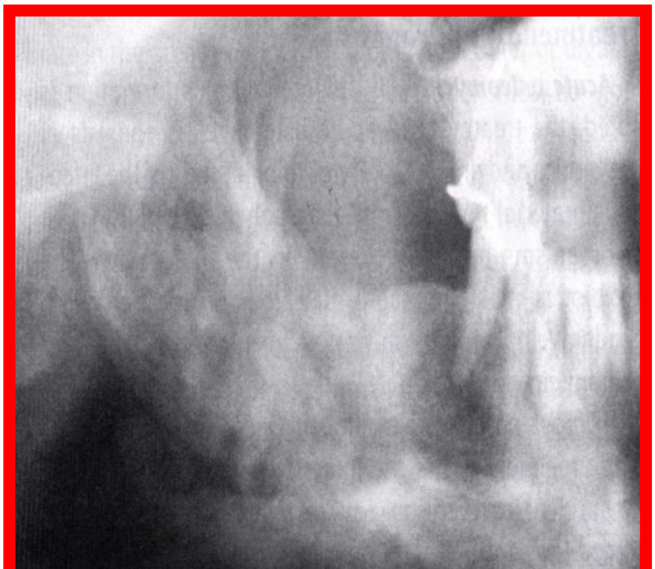
- The features are **less dramatic** than in the acute type..
- **Decreased pain** associated with chronic **smoldering progression**
- **Pain** is usually present but **varies in intensity.**

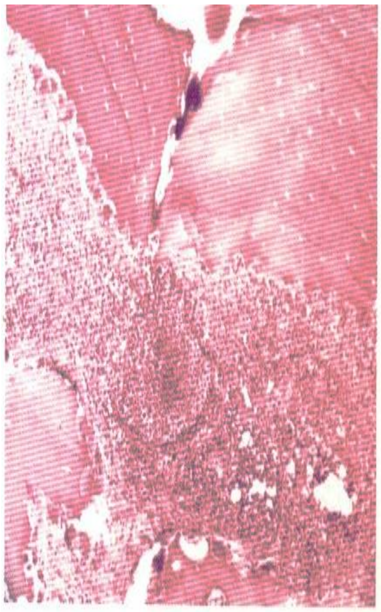
1. **Swelling** of the jaw.
2. **Looseness** of related teeth and discomfort during mastication.
3. Sinus tracts may be present **draining pus** from the jaw.
4. **Mild** fever.
5. **Moderate** leukocytosis.
6. **Pathological fracture** may be seen in some cases.

Radiographically:

- The affected part of the jaw shows a **radiolucent** lesion mottled with areas of **radiopacity** giving rise to what has been described as: ***moth-eaten*** **appearance**.







Histologic features:

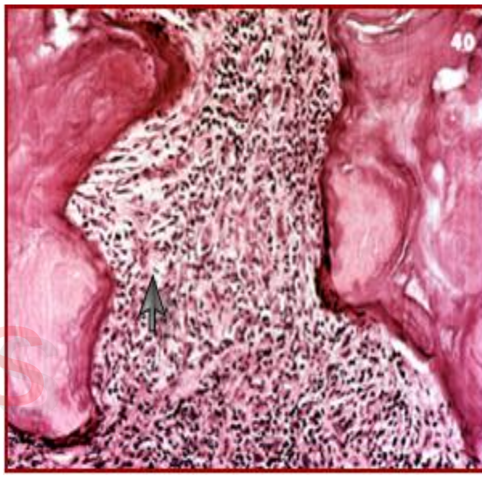
The inflammatory reaction in chronic osteomyelitis *can vary* from very **mild** to **intense.**

In mild cases:

1. **Few** inflammatory cells are seen in the **fibrous** bone marrow.

2. Both **osteoblastic** and **osteoclastic** activity may be seen along with **irregular** bony trabeculae.

3. Microscopic diagnosis can be difficult because of its **similarity** to fibro-osseous lesions



In advanced cases:

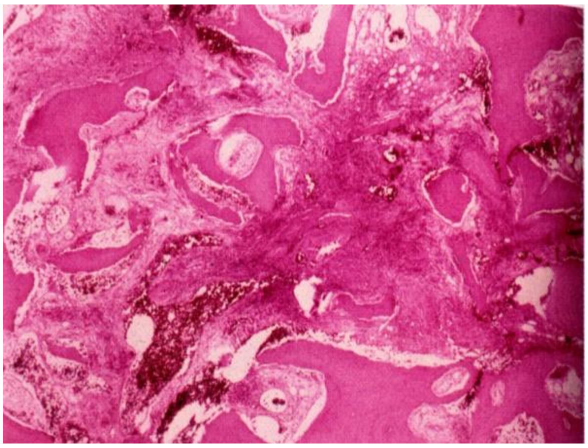
1. Necrotic bone **(sequestrum)** may be present with **loss** of both osteoblasts and osteocytes.

2. **osteoclastic activity** more prominent than in mild type..

3. **Inflammatory cells** are more numerous than in mild type

4. **Reversal lines** reflect the wave of deposition and resorption of bone

5. Presence of significant **soft tissue** component that consists of chronically or subacutely inflammed fibrous CT filling the intertrabecular areas



Treatment :

- **antibiotic.**
- **Sequestrectomy**, surgical intervention fasten the healing process.
- Surgical **removal of sinus tract**.
- **Immobilization** of the jaw if pathological fracture is expected**.**

Chronic Focal Sclerosing Osteomyelitis

- This is an **uncommon** form of bone **reaction** to infection.
- It represents a **focal bony reaction** to a **low grade** inflammatory stimulus.
- This stimulus leads to **proliferation** of bone **rather** than destruction
- resulting in localized or **focal** areas of **bone sclerosis** at the apices of teeth.

Aetiology:

1. **Pulpitis** or **pulpal necrosis** from **large** coronal restoration
2. **Malocclusion** i.e. related to a sound tooth

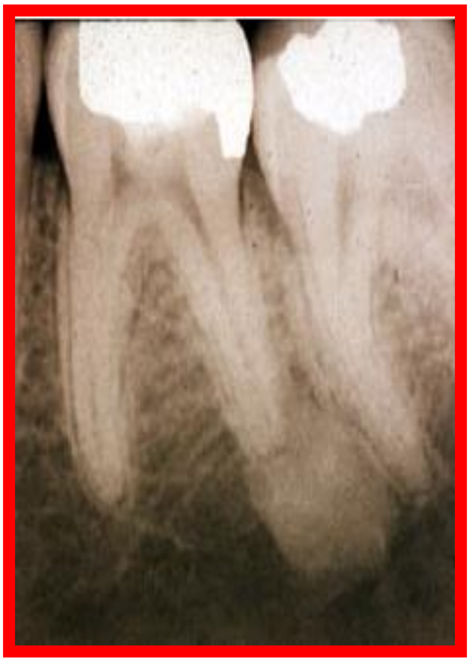
- ❖ In this case, the condition is considered as **idiopathic sclerosis** rather than osteomyelitis. No treatment of sclerosed bone.

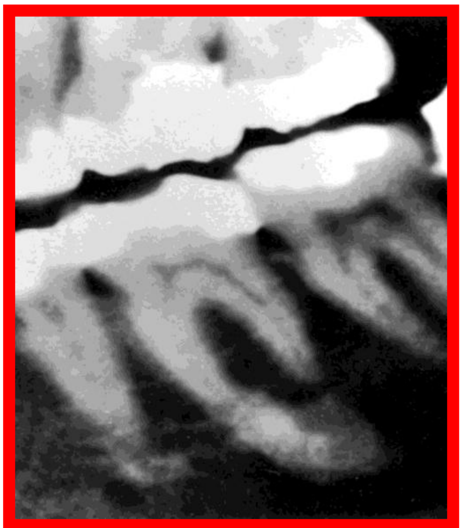
Clinical features:

1. Most lesions discovered during routine radiographic examination **i.e. asymptomatic**
2. Young adults **before 20** (although may occur at any age).
3. Related to lower molar area especially **lower 1st molar** teeth.

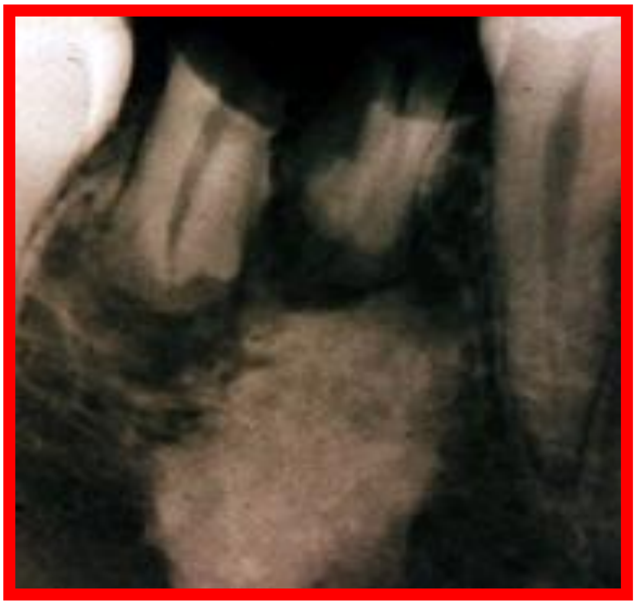
Radiographically:

1. **Well circumscribed** radiopaque area of ***sclerotic bone*** surrounding the apex of the involved tooth.
2. The **entire root outline is visible** (# benign cementoblastoma) and blends with normal bone.



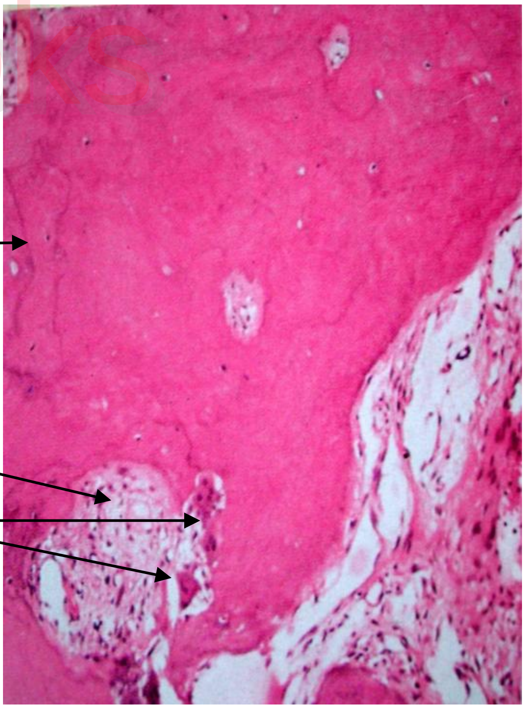


3. **Residual lesion** is seen radiographically even after extraction of related teeth.



Histologic features:

1. **Dense** masses of bone trabeculae exhibiting numerous **reversal lines**
2. **little** marrow (fibrous tissue).
3. The marrow tissue is **fibrotic** and infiltrated by **small** number of **lymphocytes.**



- ✓ Densely **sclerotic bone**
- ✓ There are **prominent reversal lines**
- ✓ Marrow spaces are **fibrosed**
- ✓ Infiltrated by inflammatory cells & osteoclasts

Chronic Diffuse Sclerosing Osteomyelitis

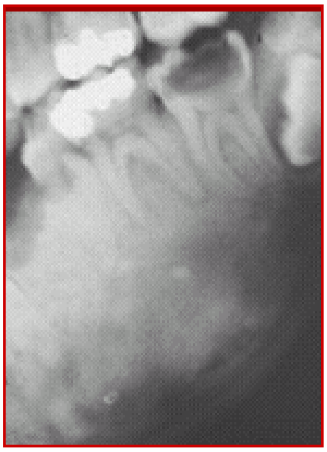
- This is similar to the focal type except that it is **more generalized** through out the jaws.
- The term **diffuse sclerosing osteomyelitis** should be used only **when an infectious** process is responsible **for sclerosis** of bone.

Aetiology:

Microorganisms (bacteria) of **low virulence**, that reaches the bone through **wide area** of entry such as chronic **diffuse periodontal** disease or might be **haematogenous** in origin.

Clinical features:

1. **Age & sex**: **Black females** of **middle age** are more affected although it may affect any race, any age, any sex.
2. **Site**: Predominantly occur in the **mandible.**
3. Pain: There may be some **vague pain**. The condition may undergo **acute exacerbation** with suppuration & the formation of draining sinuses.
4. **Microbiologic culture** should be **positive.**

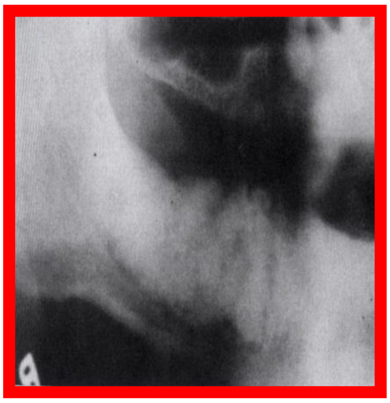


Radiographically:

- This process is **diffuse,** affecting a large part of the jaw.
- The lesion is **ill defined**.

In early stages:

Radiolucent zones may appear in association with sclerotic masses (**radiolucent** - **radiopaque**).

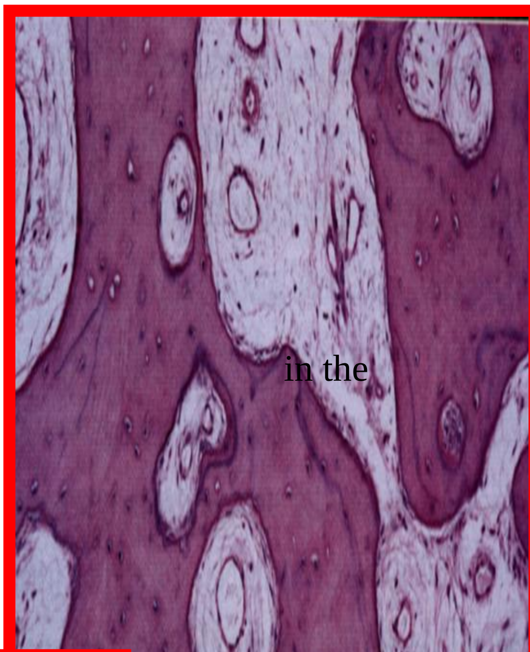


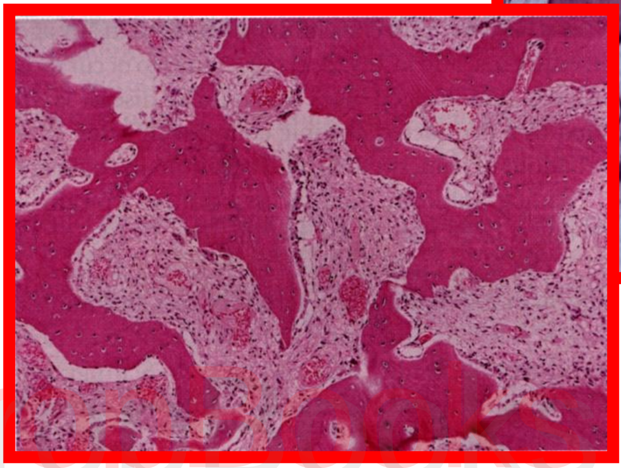
In **advanced stages:**

- **Sclerosis** dominates the X-ray picture (**radiopaque**) giving the characteristic picture of **cotton wool** appearance.
- **Periosteal thickening** may also be seen.

Histopathology:

- The lesions consists of **dense irregular bony trabeculae,** and may be lined by numerous osteoblasts.
- Focal **osteoclastic** activity is also present and their alteration with **osteoblastic** activity results in the "**Mosaic appearance**".
- The marrow is **distinctly fibrous**
- With areas of **focal infiltration** by lymphocytes & plasma cells.





Differential Diagnosis:

Paget's disease of bone

→ **Maxilla & base the skull**

N.B.

- To make a **definite diagnosis** of diffuse sclerosing osteomyelitis microbiologic cultures should be **positive** and responding to antibiotics.
- **Cases** exhibiting **negative cultures** and **non responsiveness** to antibiotics do not represent sclerosing osteomyelitis and **should be evaluated for** features of

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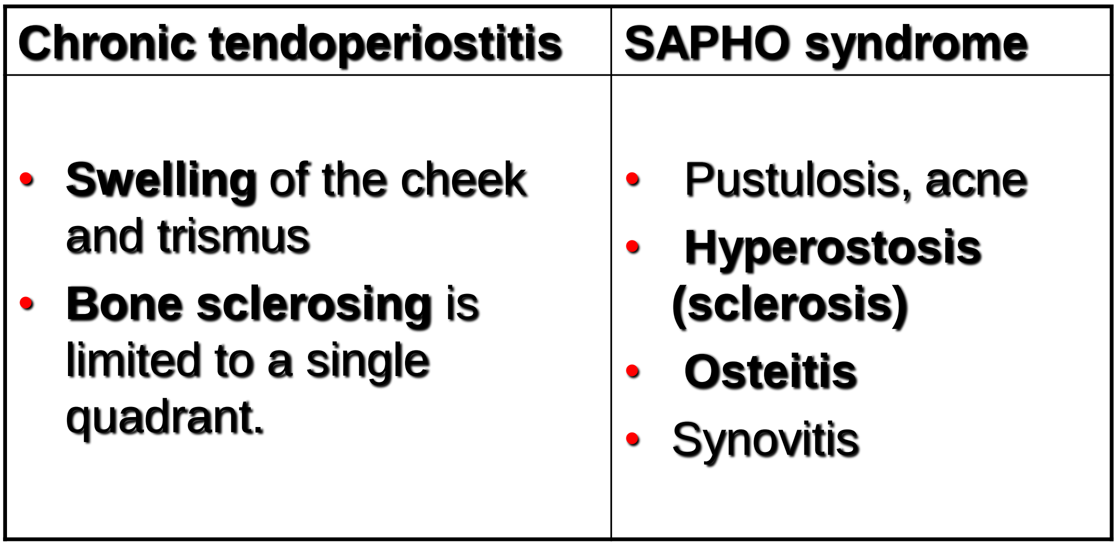
1-Chronic tendoperiostitis: caused by bruxism ,nail biting

2-Sapho syndrome :an autoimmune disturbance secondary to exposure to dermatological bacteria



Chronic tendoperiostitis	SAPHO syndrome
• **Swelling** of the cheek and trismus • **Bone sclerosing** is limited to a single quadrant.	• Pustulosis, acne • **Hyperostosis (sclerosis)** • **Osteitis** • Synovitis

Treatment:

- The **etiologic factor** such as **periodontal** disease should be identified and **eliminated**.
- **Antibiotics** especially during painful exacerbations.

❖ **Surgical removal** of the affected area **is** usually an **inappropriate** procedure **because** of the **extent** of the disease.

- **Low dose of corticosteroids** have also been used with some success.

Condensing Periostitis.

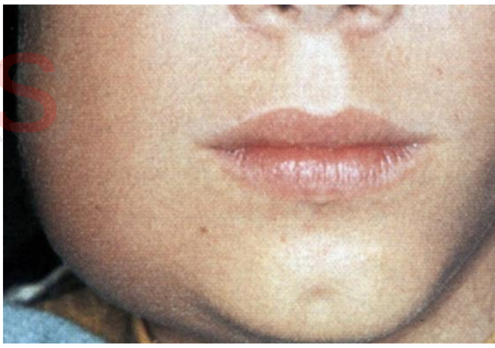
Chronic osteomyelitis with proliferative periostitis { Garre's osteomyelitis}

- It is a subtype of chronic osteomyelitis in which there is **additionally** a **prominent periosteal inflammatory** reaction.

Aetiology:

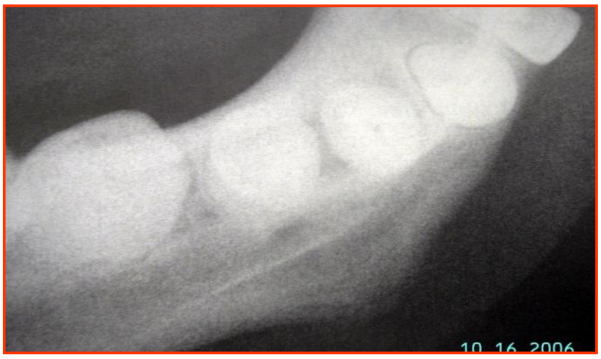
1. It most often results from a periapical abscess of mandibular molar with **spreading** of **low grade apical** inflammation through the cortical bone **stimulating a proliferative** reaction of the periosteum. {endosteum + periosteum}
2. Occasionally, may develop from **overlying** soft tissue **infection**
3. Or from **mechanical irritation** of a denture

- In these cases the endosteal bone is normal **{periosteum only}**



Clinical features:

1. Site: Usually the post **part of the mandible**.
2. Age: **Young adults** with high resistance..
3. **Asymptomatic** ,**bony hard swelling** of the **outer surface** of the jaw, of at least several weeks duration with normal overlying skin.
4. **Slight tenderness** may be noted

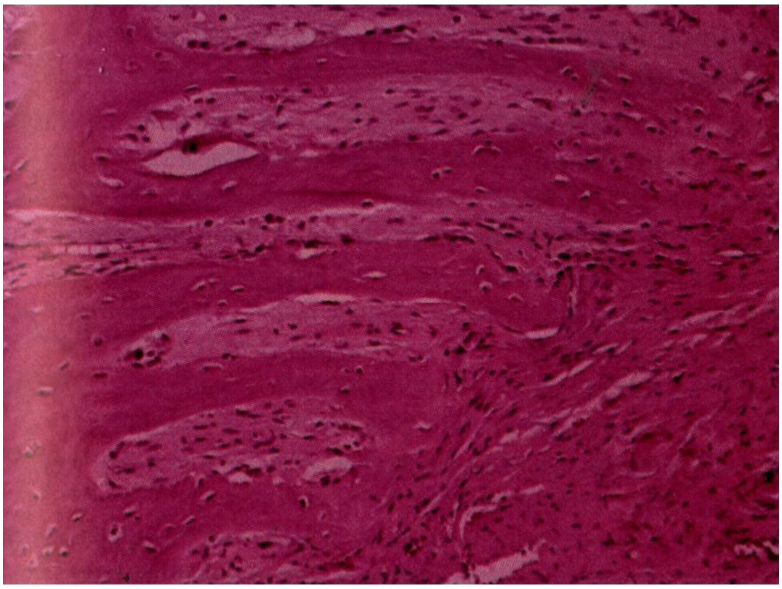


Radiographically:.

- **Lateral** jaw radiographs may **fail to show** the proliferative periosteal reaction.
- Best viewed on an **occlusal film**
- Appears as an expanded cortex, with **concentric** or parallel opaque layers
→ **Periosteal** duplication or **onion skin** appearance.
- The mass of new bone is **smooth** and **well calcified**.

Histopathology:

- Parallel rows of highly cellular woven bone in which individual trabeculae are frequently **perpendicular** to the surface **or** forming an **interconnecting meswork** of bone **or scattered** more widely.
- Between the trabeculae, relatively **uninflammed,fibrous connective tissue** is evident



Treatment:

1. **Removal of the cause.**
2. **Antibiotics.**

Then the mandible undergoes gradual remodeling without surgical interference.

References

Oral pathology2nd edition

Neville Damn Allen Bouqot**:**

Cawson's Essentials of Oral Pathology & Medicine 8thEd

Cawson. RA and Odell EW

.

Oral Pathology, clinical pathological correlations
fifth Ed, W.B.Saunders. Co 2003.

Regezi JA. Sciubba, JJ and Jordan R.CK

Oral pathology,fourth edition. J.V. **Soames** and
J.C.Southam